DOCUMENT RESUME

ED 189 944 HE 012 867

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TITLE Faculty Vitality Given Retrenchment: A Policy Analysis. AIR Forum 1980 Paper.
PUB DATE Apr 80
NOTE 23p.; Paper presented at the Annual Forum of the Association for Institutional Research (20th, Atlanta, GA, April 27-May 1, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Rank (Professional); College Administration; College Faculty; College Planning; Computer Oriented Programs; Educational Finance; Efficiency; Employment Practices; *Faculty Promotion; Higher Education; *Medical School Faculty; Medical Schools; Models; *Personnel Policy; Policy Formation; Retrenchment; *Simulation; Teacher Characteristics; *Teacher Retirement; *Tenure
IDENTIFIERS *AIR Forum 1980

ABSTRACT

The impact of alternative institutional policies on faculty mix, salary expense, and turnover is assessed. Guidelines are offered to aid health science school administrators to maintain faculty vitality through a period of retrenchment and new federal retirement law. A "typical" hypothetical school of medicine is simulated using a computerized model, and alternative policy provisions are assessed through a series of simulation runs. The Tenure and Promotion Policy Simulator model is a Monte Carlo simulation that can incorporate a variety of faculty appointment arrangements that exist in medical schools and can include different hiring, promotion, tenure granting, and resignation probabilities characteristic of the clinical (physician) faculty versus the basic science faculty. The ability of individual faculty policies to achieve an annual expense rate reduction of one percent per year over a ten-year period is assessed. The following areas are analyzed: retirement, promotion and tenure, contract systems, hiring distribution (age, rank, appointment type), and faculty replacement. (SW)

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# FACULTY VITALITY GIVEN RETRENCHMENT - A POLICY ANALYSIS

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Paper presented at the annual forum of the

Association for Institutional Research, April 1980

Atlanta, Georgia

HE 012 867

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This paper was presented at the Twentieth Annual Forum of the Association for Institutional Research held at the Peachtree Plaza Hotel in Atlanta, Georgia, April 27 - May 1, 1980. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

Mary Corcoran
University of Minnesota
(Editor, AIR Forum Publications)

## Abstract

Facing a future of static or declining funding available for faculty salaries, higher education management must evolve strategies to enable their institutions to avoid stagnation of their most prominent and essential resource—the institution's faculty. This task is especially complex in the health sciences because of the existence of two distinct faculty cohorts each with unique organizational characteristics. A simulation model designed to embody this duality is used to assess a variety of policies both individually and in combination. The authors propose guidelines for health science school administrators in formulating policies to help maintain faculty vitality given severe resource constraints.

## Perspective

Maintenance or renewal of faculty vitality under conditions of static or shrinking financial support will be one of the most challenging problems facing higher education over the next decade. As Walter Oi (1979, p. 1373) points out, "In a world of declining enrollments and tight budgets, university administrators will be hard-pressed to maintain the quality of teaching and research in their institutions."

These negative pressures are being exerted by a combination of factors familiar to planners in the higher education environment. Double digit inflation rates in the general economy erode the ability of endowment yields, tuition rates, and government support to rise at a rate adequate to provide even steady state budget projections in real dollar terms. On the enrollment side, a National Academy of Sciences study (1979, p. 12) reports "There is almost no doubt that the slowdown in total enrollment growth will continue, and the prospect is very real that such enrollments will actually decline." In fact, a study by Radner and Kuh (1978) referenced in the National Academy of Sciences report projects enrollment declines in the range of six to ten percent over the next decade. The National Academy report is not much more optimistic about the future of research funding citing "a political environment unfavorable to public spending" (1979, p. 1). The report continues this cautious tone on page 15:

> It further seems unlikely that growth in research funding will permit universities to expand their faculties substantially. Given the short-term nature and instability of most research funding, research funds do not generally provide an acceptable base for establishing regular faculty positions. Furthermore, while trends in research funding are hard to predict, and are highly field

> dependent, there is little reason for confidence that growth rates of spending like those of the 1960's can be expected in most--if any--fields.

Professor Oi (1979, p. 1374) points out that in addition to the above conditions the new federal legislation prohibiting institutional mandatory retirement policies below age 70 (Public Law 95-256) will aggrevate this situation:

> If universities adhere to their existing salary policy when PL 95-256 goes into effect, direct costs will rise because the mean salary of 65 year-olds is roughly twice that of new assistant professors. In addition, a lower personnel turnover rate will result in higher intangible costs. The legislatively induced decline in faculty retirement rates comes at an especially bad time when student enrollments will be falling. In a contracting market universities must rely on deaths, retirements, and departures to nonacademic positions to generate vacancies for new Ph.D's. With lower retirement rates fewer jobs will be available for potential new entrants. The prospect that a department may have to go for 10 or 15 years with no new assistant professor appointments is not a very promising one for academic excellence.

Medical Schools in the United States, on which this paper primarily focuses, do not have a natural immunity from the above diseases, although the pace of affliction is not as rapid as for most of the rest of higher education. The early symptoms are starting to be observed, however, and it is the contention of the authors that the epidemiology of the disease will be the same in medical schools as elsewhere. The Wall Street Journal (April 14, 1980, p. 1) recently reported:

> An ample supply of doctors is likely by 1990, a report by the Department of Health, Education and Welfare stated. It predicted a total of 600,000 U.S. physicians, while requirements could be as low as 553,000. Shortages of doctors in rural areas, inner cities, and general practice are expected to ease.

These statistics would indicate that the country may be facing an oversupply of physicians in the range of ten percent over the next decade. Such predictions are influencing policy-making in the federal government and the administration has been working to phase out capitation support of medical schools. The capitation program was started in the 1960's to encourage medical schools to expand their production of physicians.

Reacting to the impact of broad environmental constraints is particularly complex in the health sciences because of the existence of two distinct faculty groups (clinical and basic science) each with unique organizational characteristics. The clinical faculty have significant patient service responsibilities, tend to be more mobile, and have a greater variety of faculty advancement opportunities open to them than do their non-clinical colleagues, who are more stable and exhibit career track characteristics paralleling faculties elsewhere in the university.

The purpose of this paper is to assess the impact on faculty mix, salary expense, and turnover rate of alternate institutional policies, and to propose a set of guidelines to aid health science and other university leadership in their efforts to maintain faculty vitality through a period of retrenchment and under the influence of the new federal retirement law. The technique used by the authors is to simulate a "typical" hypothetical school of medicine with a computerized model, and to assess alternate policy provisions via a series of simulation runs.

## Problem Definition and Approach

### Operating Environment and Goals

Based on the economic, enrollment, and research support projections for the next decade summarized in the previous section, the authors established a long-range planning criterion for faculty vitality analysis of a one percent loss per year in effective (constant 1980 dollars) purchasing power of the school budget. The assumption here is that the current dollar budget of the simulated school will increase because of increased return on endowment, tuition increases and modest increases in support from public sources. However, these income increases will not quite keep up with inflation, and expenditure reductions in constant dollar terms will be required at the rate of one percent per year to maintain fiscal viability.

The goals of the authors in assessing various policy alternates in this study were to achieve the annual one percent reduction in faculty salary expense described above, and to assess the impact of those policies on faculty rank distribution, turnover rate, and average age.

### Model

The Tenure and Promotion Policy Simulator (TPPS) model used in this study was described in a paper presented at the 1979 annual forum of the Association for Institutional Research (Kutina and Bruss, 1979). It is a Monte Carlo simulation developed at Case Western Reserve University (CWRU) under subcontract with the Association of American Medical Colleges (AAMC) with funding from the National Library of Medicine. TPPS was designed to have adequate flexibility to allow incorporation of the wide range of faculty appointment arrangements that exist in medical schools around the country, and in addition to allow for inclusion of the different hiring, promotion, tenure granting, and resignation probabilities characteristic of the

clinical (physician) faculty versus the basic science faculty.

A detailed report on TPPS, including flow charts, input forms, program listings and operating guides (Kutina, et al, 1979) is available at cost from the AAMC, Washington, D.C.

Normal Medical School

In an effort to maximize the general applicability of the results of this analysis the authors used TPPS to simulate a hypothetical "Normal Medical School" (NMS) which was formulated using aggregate national medical school data to the greatest possible extent. Faculty size for NMS (367) was obtained from the Institutional Profile Annual Report (AAMC, 1978). Faculty distribution by rank and tenure status came from an AAMC study on characteristics of U.S. medical schools (Higgins, 1979). Mean faculty salaries by rank were obtained from another AAMC study which is done annually (Smith, 1980).

Characteristics of individual faculty members including ages for the starting faculty file were obtained by randomly selecting individuals from the current CWRU School of Medicine faculty in proportion to the national profiles. This random selection was possible since the CWRU Medical School has a faculty which is more than twice the size of the national average.

## Policy Analysis

> Were an institution to adopt a policy of keeping the compensation budget constant, there would have to be reductions in new hires even without the retirement age change. With it, new hires would have to fall in some cases, and layoffs would be required in order to adjust. (Finkin, et al, p. 191)

Although it is argued by Finkin and his colleagues that keeping the salary budget constant will require a reduction in faculty size (either through

attrition or layoffs), the authors of this paper set a more stringent goal of seeing if an actual reduction in (constant dollar) salary expense could be achieved at NMS by implementation of policies other than reduction of faculty size. Although an obvious method of reducing total faculty salary expense would be to escalate salary scales at less than the inflation rate, the authors feel this is an undesirable option. To maintain quality in teaching, research and patient service, salary scales must remain competitive to reward and retain an institution's outstanding faculty.

The faculty policies examined in this paper are all controllable, to varying degrees, by an individual institution. Some, like retirement, are not totally controllable at the institutional level, although their impact can be altered by the introduction of various incentive programs. Others, such as promotion criteria, are much more internally controllable.

The following sections discuss the ability of individual faculty policies to achieve an annual expense rate (AER) reduction of one percent per year over a ten year period. In addition, they are tested as to their impact and sensitivity in altering faculty distribution and turnover.

Retirement

To highlight the differential impact of changing retirement ages, the authors chose to test the simplified model of having all retires occur at the test age only; the test ages being 60, 65, and 70.

An interesting phenomenon occurs in the early retirement (age 60) test. The short run impact (three to four years) shows a dramatic drop in percent senior faculty and correspondingly in total faculty salary. However, after the initial drop, the percent senior faculty steadily rises, approaching the starting level (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

This phenomenon has been demonstrated before (Hopkins, 1974), and indicates that early retirement programs are not as effective in permanently altering faculty distribution as one might intuitively expect. Similarly, the results of a retirement age set at 70 do not, in the long run, support the fears prevalent in today's academic administration of having a dramatically older and more senior faculty. Average faculty age and percent senior faculty increase only marginally; and surprisingly, turnover rates actually slightly rise (see Table 1). This counterintuitive result is due to the fact that when older faculty are in the system longer, there is a greater opportunity for age-related turnover factors other than retirement, (such as death and resignation) to have an increased impact.

Note that the above analyses were done without considering the incentive costs for introducing an early retirement program. When those costs are subtracted from the savings accrued, the ten year impact of such programs would appear not significant enough to warrant implementation.

INSERT TABLE 1 ABOUT HERE

Promotion and Tenure

To examine the effects of promotion and tenure granting policies, three simulations were made of the long-term impact of promoting and tenuring at rates less than that used for the NMS base case. Total faculty salary expense should decline with the introduction of a more stringent promotion policy as movement to higher salaried ranks is restricted. In addition, the turnover rate will increase since access to tenure will be limited as faculty remain longer at lower ranks.

Promoting at half the current rate yields a significant decline in percent senior faculty (approximately eight percent of total) and in AER (-.51%). To determine an extreme, a promotion policy of one quarter the current rate was

tested, and found to drop AER to -.82%. The relationship between promotion policy, AER, and percent senior faculty appears to be linear over the range tested (Table 1). More strict tenure granting policies yield less dramatic results, with the benefits accrued exhibiting diminishing returns, as shown in Figure 2.

INSERT FIGURE 2 ABOUT HERE

Contract Systems

The concept of changing from traditional tenure to either periodic review or a contractual arrangement has been suggested as a method of maintaining faculty vitality and productivity (Oi, 1979).

Three separate contract scenarios were tested, the results of which are displayed in Table 1:

1. Five year contracts are given to assistant professors, ten year contracts to associate and full professors, and one year contracts to instructors. In this test all faculty currently tenured remain tenured, and no new appointments or hires to tenure are made.
2. Same as above, except all faculty are immediately switched to a contract.
3. Seven year contracts are given to full professors, five year contracts to associates, three year contracts to assistants, and one year contracts to instructors.

The probabilities for contract renewal for NMS were derived from existing CWRU tenure granting data, adjusted according to the authors' sense of how such a system would function. The results indicate that either 5/10 contract system would not significantly alter AER, although a small shift in percent senior faculty is observed. The more stringent 3/5/7 contract system begins to exhibit notable shifts in both expense and percent senior faculty, but not to the extent one might expect. It appears that faculty distribution and salary expense are fairly insensitive to the introduction of a contract

system unless policies with relatively short contract lengths are put into effect.

Hiring Distribution

The faculty hiring profile (age, rank, appointment type) which is utilized in the base case for NMS was derived from existing CWRU data. Overall, the base profile results in approximately 20% of all new hires being made at the senior faculty level.

To effect a reduction in AER, a case was run shifting the hiring profile to weight it even more heavily to junior faculty. Assuming that NMS will have to continue to fill at least some senior level positions, such as department chairmen, the profile was adjusted to have 90% of all openings filled by junior level faculty.

The result of implementing this policy, as shown in Table 1, is a significant decline in percent senior faculty (six percent), and a -.22% change in AER. It is clear that some progress is achievable toward the expense reduction goal by hiring profile alteration. However, the extent of progress is limited since the base profile is already heavily weighted toward the lower ranks.

Replacement

To reduce overall faculty compensation, an obvious method, though not necessarily the most desirable from a programmatic point of view, would be to let the total faculty size decline through natural attrition. To test both the decline observed, and the savings in total salary expense, two simulations were made: one assumes that 90% of all faculty departures will be replaced according to the base hiring profile, while the other provides for replacement at the 80% level.

The 90% replacement policy drops the number of faculty by nearly nine percent over the ten year period. An AER of -.858% is observed. An 80% replacement rate drops the faculty size by 15% over a ten year period, and

yields an AER of -1.44%. Both policies have little effect on the percent senior faculty, turnover rate, or average faculty age.

## Conclusions and Recommendations

Although a fairly modest reduction in total faculty size via attrition can yield an AER of -1.0%, the goal set in this study was to achieve this rate while holding faculty size constant. Five cases were run combining those policies which had a fairly large individual impact, and which were not so extreme as to be impractical for implementation.

Case 1 combines promoting and tenuring at half the base rate. As shown in Table 2, the combined effect of these policies results in an AER of -.583%, which is less than the simple sum of the effects of the two policies operating separately. Although some gain is achieved, the interactive effect of these two policies reduces much of the expected utility one would hope to achieve via their implementation.

INSERT TABLE 2 ABOUT HERE

Shifting of the hiring profile toward more junior faculty coupled with a doubling of promotion difficulty is tested in Case 2. The sum of the individual effects of these two policies, as can be seen in Table 1., is an AER of -.728%. A synergistic (positive interaction) effect is observed, however, when the two policies are implemented simultaneously, and, as is shown in Table 2., an AER of -.829% is achieved. Since the goal of a one percent annual expense reduction was still not obtained, the authors, in Case 3, shifted the hiring profile to what they viewed as the absolute minimum proportion of senior faculty, setting that fraction to be hired at five percent. This combined policy also fell short of the target, yielding an AER of -.901%.

Two combined policy approaches, shown as Cases 4 and 5 in Table 2., achieved the authors' expense reduction objective. Case 4 is based on making

promotion and tenure award twice as diffucult to obtain, and utilization of a hiring profile which results in 95% of replacements hired at the junior ranks. This policy combination achieves at NMS an AER of -1.135%. An alternate policy combination that also reaches the target is the same as Case 4, but with the tenure system replaced by a contractual arrangement. The contract system used in Case 5 was the most stringent tested--the 3/5/7 system described in the Contract Systems section of the body of this report. Unfortunately, by the tenth year it also produces a turnover rate of 11.6% which might be regarded as approaching a dangerously high level.

The distribution of faculty in these analyses on NMS is clearly most sensitive to changes in promotion and hiring policies, and a significant synergistic effect is observed when these two policies are implemented together. The authors suggest that in planning for the decade ahead, institutional policy analysts faced with problems similar to those discussed in this paper, consider constraining promotion, hiring predominantly at the junior level, tightening access to tenure, or instituting a contract system, in that order to achieve expense reduction via a shift in faculty rank distribution.

## Acknowledgements

The authors wish to gratefully acknowledge the assistance of Suzanne K. Polmar, Ph.D., and Carleen K. Carver for their assistance in the data acquisition and analysis phases of this study.

## References

Association of American Medical Colleges. Memorandum #78-55: 1976-77 Institutional profile annual report. Washington, D.C., 1978.

Commission on Human Resources. Research excellence through the year 2000. Washington, D.C.: National Academy of Sciences, 1979.

Finkin, M., Bernstein, M., Eymonerie, M., Hammerle, W., Hansen, W., Schultz, T., Steiner, P. The impact of federal retirement-age legislation on higher education. American Association of University Professors Bulletin, 1978, Vol. 65, 181.

Higgins, E. Comparison of characteristics of U.S. medical school salaried faculty in the past decade 1968-1978. Washington, D.C.: Association of American Medical Colleges, 1979.

Hopkins, D. Faculty early-retirement programs. Operations Research, 1974, Vol. 22, 455.

Kutina, K. and Bruss, E. Faculty flow in a medical school - a policy simulator. Paper presented at the 19th Annual Forum of the Association for Institutional Research, San Diego, May 1979. (ERIC No. ED174091).

Kutina, K., Bruss, E., Carver, C., Polmar, S.K. Tenure and promotion in schools of medicine - a policy simulator. Washington, D.C.: Association of American Medical Colleges, 1979.

Oi, W. Academic tenure and mandatory retirement under the new law. Science, 1979, Vol. 206, 1373.

Radner, R., and Kuh, C. Preserving a lost generation: policies to assure a steady flow of young scholars until the year 2000. A report to the Carnegie Council on Policy Studies in Higher Education: October, 1978.

Smith, W. Jr. Report on medical school faculty salaries 1979-1980. Washington, D.C.: The Association of American Medical Colleges, 1980, 16.

The Wall Street Journal. An ample supply of doctors. April 14, 1980, 1.

## TABLE 1. Individual Policy Impact Analysis

| | Percent Senior Faculty | Avg. Faculty Age | Percent Turnover | AER[1] | Avg. Faculty Salary |
|---|---|---|---|---|---|
| BASE CASE - YEAR 10 | 53.1% | 46 | 7.7% | 0% | $45,100 |
| **Retirement:** | | | | | |
| All retire at 70 | 54.8% | 46 | 8.2% | +.071% | $45,500 |
| All retire at 65 | 53.4 | 45 | 7.6 | -.097 | 44,700 |
| All retire at 60 | 50.7 | 44 | 8.9 | -.208 | 44,200 |
| **Promotion/Tenure:** | | | | | |
| .75 normal promotion | 49.6% | 45 | 8.4% | -.220% | $44,200 |
| .50 normal promotion | 45.8 | 45 | 8.8 | -.513 | 43,100 |
| .25 normal promotion | 43.3 | 46 | 8.5 | -.817 | 41,600 |
| .75 normal tenure | 51.2 | 45 | 8.9 | -.124 | 44,600 |
| .50 normal tenure | 47.7 | 45 | 9.2 | -.251 | 44,000 |
| .25 normal tenure | 47.1 | 45 | 9.6 | -.306 | 43,800 |
| **Contract Systems:** | | | | | |
| 5/10, retain tenured | 55.9% | 46 | 8.9% | +.072% | $45,500 |
| 5/10, all contracts | 51.8 | 45 | 10.6 | -.089 | 44,700 |
| 3/5/7, all contracts | 48.8 | 44 | 11.3 | -.254 | 44,000 |
| **Hire Profile Change:** | | | | | |
| 90% junior level | 47.4% | 45 | 8.5% | -.215% | $44,200 |
| **Replacement:** | | | | | |
| At 90% rate | 51.0% | 46 | 7.7% | -.858% | $45,400 |
| At 80% rate | 51.0 | 47 | 7.7 | -1.440 | 46,100 |

[1]AER, Annual Expense Rate, is defined as the average percent annual change (+ or -) in total faculty compensation over the ten year period.

TABLE 2. Multiple Policy Impact Analysis

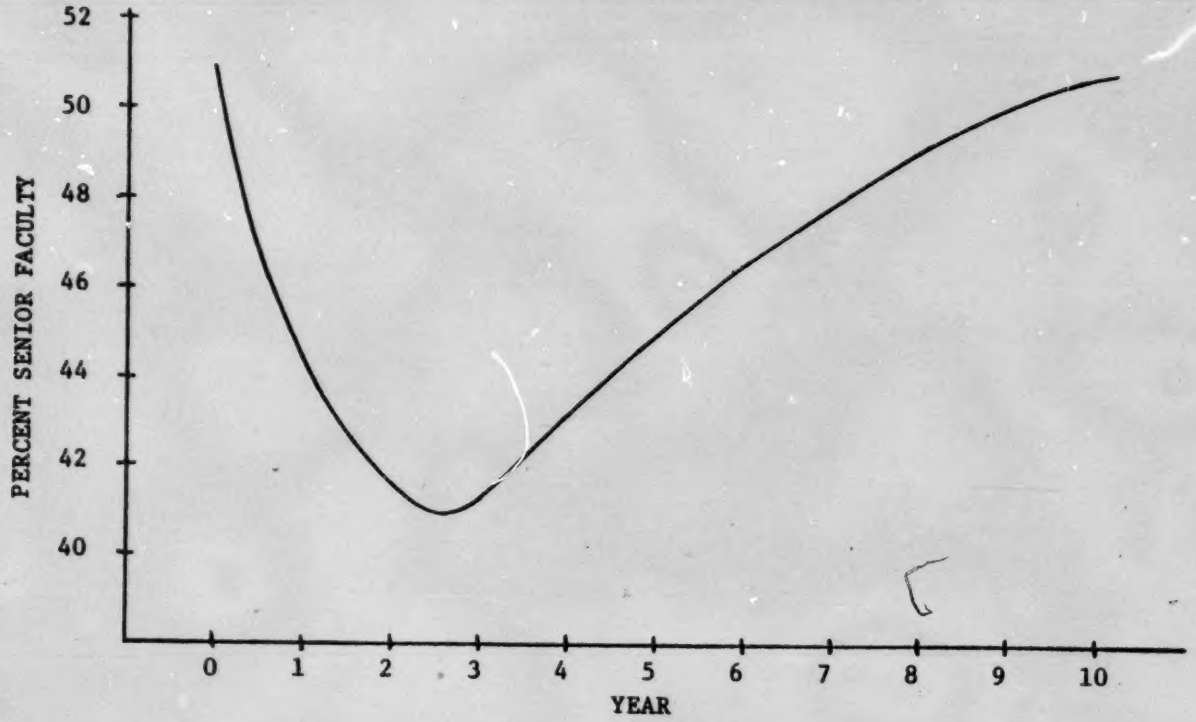
| | Percent Senior Faculty | Avg. Faculty Age | Percent Turnover | AER[1] | Avg. Faculty Salary |
|---|---|---|---|---|---|
| BASE CASE - YEAR 10 | 53.1% | 46 | 7.7% | 0 | $45,100 |
| Case 1 | 43.9% | 45 | 8.5% | -.583% | $42,600 |
| Case 2 | 40.3 | 45 | 8.2 | -.829 | 41,500 |
| Case 3 | 38.4 | 45 | 8.9 | -.901 | 41,200 |
| Case 4 | 31.6 | 44 | 9.3 | -1.135 | 40,300 |
| Case 5 | 34.6 | 44 | 11.6 | -1.156 | 40,200 |

[1]AER, Annual Expense Rate, is defined as the average percent annual change (+ or -) in total faculty compensation over the ten year period.

## Figure Captions

Figure 1. Effect of retirement age shift from 65 to 60

Figure 2. Constraining access to tenure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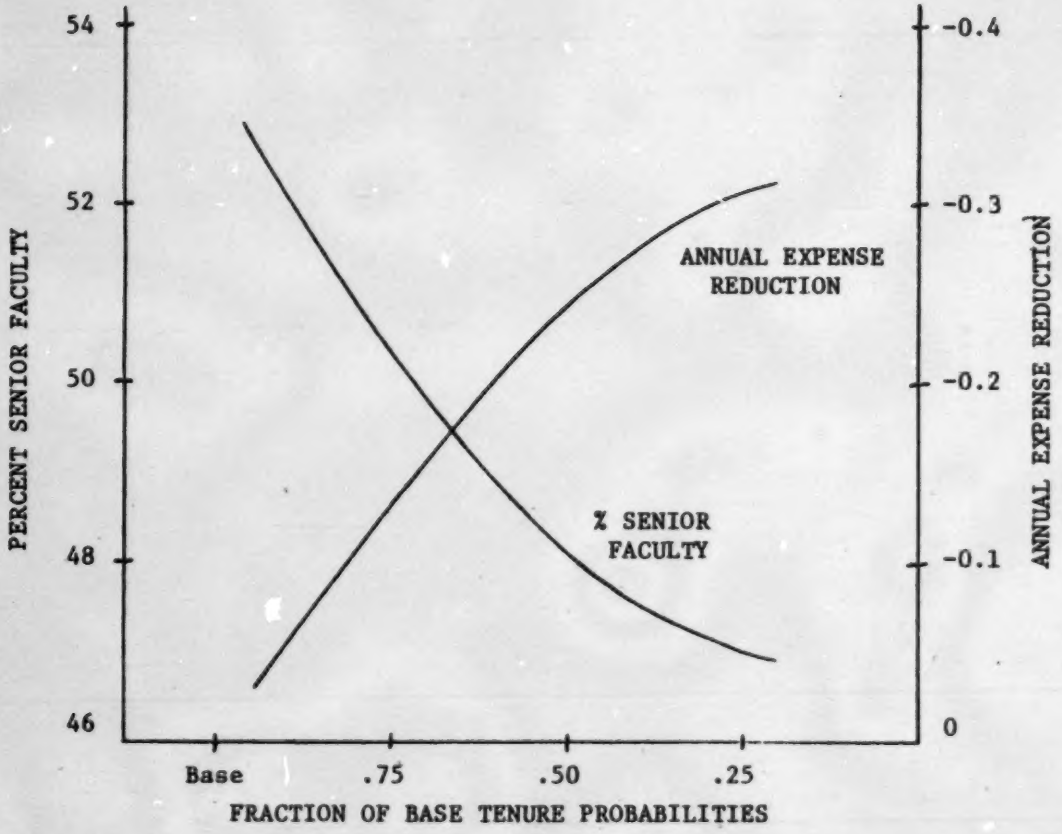
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